

Fiscal Year 2007



Center for the Advancement of Sustainability Innovations

<https://casi.erdcl.usace.army.mil>

November 30, 2007



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Report Documentation Page			Form Approved OMB No. 0704-0188		
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 30 NOV 2007		2. REPORT TYPE		3. DATES COVERED 00-00-2007 to 00-00-2007	
4. TITLE AND SUBTITLE Center for the Advancement of Sustainability Innovations				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Engineer Research and Development Center (ERDC), Construction Engineering Research Laboratory (CERL), PO Box 9005, Champaign, IL, 61826-9005				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 12	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



Summary

During its first year of activity, CASI has been engaged with numerous collaborators in helping identify and implement opportunities for USACE, the Army, and other military organizations to improve their "triple bottom line" of mission, community, and environment. This report describes some of these collaborations and details plans for 2008. While CASI is an ERDC initiative, the center's projects and activities are conducted with many other organizations and partnerships beyond ERDC in efforts

to gather the best teams to address military sustainability challenges.

One project just getting underway will help Army stakeholders find "comparison or benchmark" sustainability efforts in industry and in foreign

military organizations. This effort should also increase dialogue and collaboration between the U.S. military and these other organizations. Another proposed effort in 2008 will help the military understand how water needs, water supplies and water use strategies might impact military operations and facilities over the next several decades as population growth, climate change, land use change, energy use, and other factors interact to complicate planning. During 2008, CASI also plans to partner with the Huntsville ISCX to identify potential sustainability advances in selected acquisition activities.

CASI impact related to improvements in the sustainability of military operations -

If in military and civil activities, we successfully reduce our environmental footprint, improve our stakeholder and community relations, while maintaining and enhancing mission capability, then we will be contributing toward the goals articulated by U.S. military leadership to sustain the mission and secure the future.



References

Army Environmental Policy Institute - *Foresight, Searching for Sustainability*. Bulletins and other information at: <http://www.aepi.army.mil/foresight.html>.

Army Strategy for the Environment, Sustain the Mission, Secure the Future, October 1, 2004. <http://www.sustainability.army.mil/overview/ArmyEnvStrategy.pdf>

Army Sustainability Committee: http://www.sustainability.army.mil/resources/library_committee.cfm

Army Sustainability Website: <http://www.sustainability.army.mil/>

CASI Website: <https://casi.erdcl.usace.army.mil/>

Corps of Engineers Environmental Operating Principles: <http://www.hq.usace.army.mil/cenp/envprinciples.htm>

Goran, William D., "ERDC Launches Center for the Application of Sustainable Innovations," *Public Works Digest*, U.S. Army Installation Management Command, Volume XVIII, Nov/Dec 2006.

Regional Planning/SERM (Sustainability, Encroachment and Room to Maneuver) Website: <https://eko.usace.army.mil/fa/serm/>

Sustaining the Mission, Preserving the Environment, Securing the Future, Association of the U.S. Army (AUSA) Torchbearer National Security Report, Feb 2007.

USACE Sustainable Design and Development Website: <https://eko.usace.army.mil/fa/sdd/>



CASI's First Year: A Summary Report

Background: The Center for the Advancement of Sustainability Innovations (CASI) was established by the Engineer Research and Development Center (ERDC) as a new capability in fall 2006 to be hosted at the Construction Engineering Research Laboratory (CERL) in Champaign, IL. CASI was established with the goal of focusing the value of ERDC expertise, technologies and partnerships toward helping the U.S. Army Corps of Engineers (USACE), the Army, and the Department of Defense (DoD) achieve more sustainable facilities and operations. CASI aims to contribute toward an objective, stated in the Association of the U.S. Army Torchbearer Issue (Feb 07) entitled *Sustaining the Mission, Preserving the Environment, Securing the Future*, which holds that Army sustainability is a true combat and national security multiplier.



Army Strategy for the Environment's "triple bottom line: Mission, Community, and Environment."

Sustainability innovations from CASI and its partners are measured against the triple bottom line, as stated in the *Army Strategy for the Environment* (Oct 05): 1) benefit to organizational missions, 2) benefit to communities that help support, and are impacted by, preparations for and the conduct of defense missions, and 3) benefit to the environment.

CASI Organization: To help organize ERDC and its partners' capabilities toward these goals, CASI has organized "technology focus areas" involving domains for which we can provide capabilities and expertise relevant to USACE, Army, and DoD sustainability requirements. Eight technology focus areas were active during 2007 and additional areas are planned to be organized during 2008. Those technology focus areas active in 2007 include:

- Anticipating future issues & opportunities
- Sustainability approaches, measures, & knowledge management
- Sustainable regional planning
- Sustainable energy solutions
- Sustainable facilities and infrastructure
- Sustainable water resources
- Ecosystem services and natural capital
- Sustainable forward military operations

In 2008, activities are again planned in all of these focus areas, plus two additional ones:

- Sustainable materials
- Climate change impacts on agency facilities and missions

This document summarizes the primary activities of CASI during first year of operations and plans for the upcoming year. It should be noted that ERDC and its partners throughout 2007 participated in many forums and projects related to USACE, Army, and DoD sustainability beyond those reported in this document. The report is narrowly focused on efforts that were enhanced by, initiated through, or supported directly by CASI.

In 2007, CASI focused on building relationships and attempting to identify those critical projects that will help shape future Army and USACE activities. Ideas from projects and activities come from multiple sources. Two very important forums for CASI's direction emerged as the CASI director and technology focus area leads

participated in the Army Sustainability Council and the recently formed USACE Sustainability Council. Many other concepts for projects come directly from USACE and Army plans, such as the draft *Army Strategy for Sustainability*.

CASI's 2007 efforts reflect significant opportunities and interested stakeholders. For example, CASI is partnering with the Army Environmental Policy Institute (AEPI), Army Research Office (ARO), and the Maneuver Support Center Directorate of Environmental Integration (MANSCEN-DEI) on developing a technology roadmap for sustainable forward operations. The center also partnered with the Office of the Secretary of Defense (OSD) Sustainable Ranges Program, Office of Economic Adjustment, AEPI, the Installation Sustainability Planning effort and others on developing regional "futures" analysis capabilities that extend the temporal and spatial horizons of stakeholder interactions with the military. These efforts and others described in this report are intended to fundamentally change DoD's future operations in ways that effectively support the triple bottom line of mission, community, and environment.



FY07 Projects, Activities, Forums, and Publications*

Anticipating Future Sustainability Issues

Lead: Mr. William Goran, ERDC-CERL

Activity: William Goran participates as a member of the Foresight Consultative Team, which advises the Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health (DASA-ESOH) on emerging issues. This forum was established as part of the *Army Strategy for the Environment* to ensure that the Army is "looking forward" as it seeks to anticipate future sustainability issues. Other members of this team are from the U.S. Military Academy at West Point (USMA), Army War College, MANSCEN-DEI, ARO, and the Center for Environmental Management of Military Lands.

Each year, emerging issues are selected for briefings, *Foresight* bulletins, and presentations at Army, DoD, and other forums as a way to engage stakeholders. Two topics were featured during 2007: Ecosystem Services and Markets (Mar 07), and Climate Change (Jul 07). During summer 2007, several additional emerging issues were identified:

- Water supply for military bases (CONUS and OCONUS)
- Role of the military in spreading and responding to global health threats (pandemics)
- Micro-grids for full spectrum of military operations – from fixed facilities to forward basing and reconstruction
- Regional planning beyond the fence line – in greater habitat and watershed areas (working with multiple stakeholders)
- Sustainability knowledge sharing

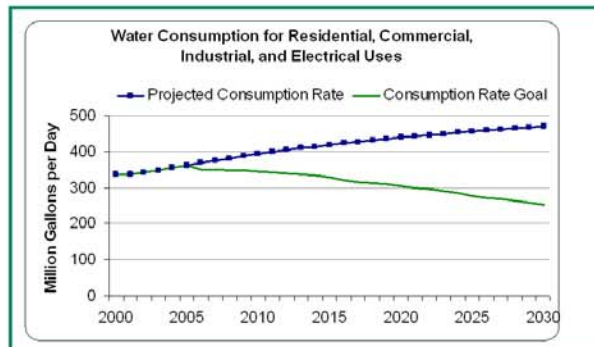
***Projects** are funded efforts conducted through CASI. **Activities** are collaborations that engage CASI with others. **Forums** are meetings, conferences, symposiums, workshops, and other events held through CASI or with CASI involvement. **Publications** may precede or result from a project, activity, or forum.

Technology Area Projects and Presentations

Sustainability Approaches, Education, and Knowledge Management

Lead: Ms. Michelle Hanson, ERDC-CERL

Project: Sustainability Measures and Benchmarks. Project aims to help Army stakeholders advance their sustainability goal-setting and evaluation by identifying opportunities, locating organizations for benchmark comparisons, and selecting appropriate measurement tools. ERDC POC: Michelle Hanson, michelle.j.hanson@erdc.usace.army.mil, 217-373-3389. Team members: David Krooks, Stuart Foltz, Jim Westervelt, Chris Rewerts. Sponsor: David Sheets, AEPI. Collaboration: Shannon Lloyd and David Eady, Concurrent Technologies Corporation (CTC).



Fort Bragg's water usage pattern projected to 2030.

Sustainable Regional Planning

Lead: Dr. James Westervelt, ERDC-CERL
Website: <https://eko.usace.army.mil/fa/serm/>

Project: Strategic Sustainability Assessment (AEPI, University of Illinois). Sustainable planning for Fall Line (Fort Bragg to Fort Benning) bases and neighbors. ERDC POC: Elisabeth Jenicek, elisabeth.m.jenicek@us.army.mil.



217-373-7238. Collaborators: CTC, Ecologix Group, The Pertan Group, University of Illinois at Urbana-Champaign (UIUC). UIUC Land Evaluation and Use Model (LEAM) Lab: <http://www.learm.uiuc.edu/learm/>, LEAMGroup, Inc. Sponsor: Karen Baker and John Fittipaldi, AEPI.

Project: Phase I: Southeast Regional Partnership for Planning and Sustainability (SERPPAS). Sustainable planning issues in a selected region (Fort Benning to Eglin Air Force Base [AFB] corridor) of the southeast. Sponsor: OSD Sustainable Ranges, Jan Larkin. SERPPAS: <http://wrrc.p2pays.org/serppas/index.asp> ERDC POC: Jim Westervelt, james.d.westervelt@us.army.mil, 217-373-4530. Partnership: Will Allen, The Conservation Fund.



An agreement signed by multiple agencies and the Fort Benning local community aims to proactively protect the gopher tortoise in an effort to avoid listing under the Endangered Species Act.

Project: Southwest Sustainable Planning (Desert Research Institute [DRI] and OSD Sustainable Ranges). Sustainable planning for Nellis AFB/Las Vegas, Yuma, AZ, and California border area. DRI: <http://www.dri.edu/> ERDC POC: Alan Anderson, alan.b.anderson@erdc.usace.army.mil, 217-373-7233. Collaborators: David Mouat, DRI. Sponsor: Jan Larkin, OSD Sustainable Ranges Program.

Sustainable Energy Solutions

Lead: Dr. Tom Hartranft, ERDC-CERL

Website: <http://www.cecer.army.mil/td/tips/product/details.cfm?ID=1004>

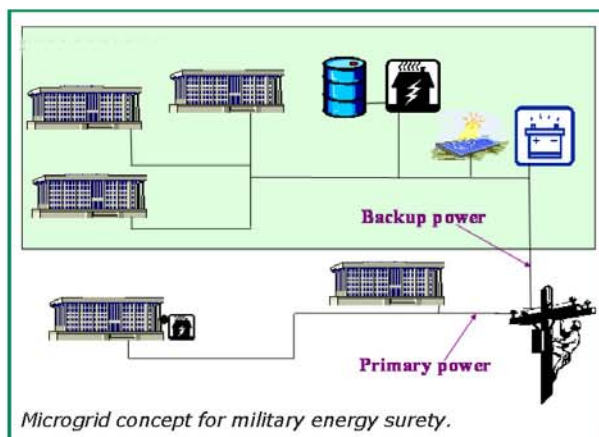
Publication: Drafted an article entitled "Potential Military Applications of Energy Micro-Grids," by Roch Ducey and William Goran, for Oct 2007 publication in *EM (Environmental Management) Magazine*.

Activity: Collaborated with Strategic Environmental Research and Development Program (SERDP) and National Renewable Energy Lab (NREL) to develop Statement of Need (FY08 project) on micro-grid controls/storage. ERDC POCs: Tom Hartranft and Roch Ducey,

roch.a.ducey@erdc.usace.army.mil, 217-373-6760. SERDP POC: John Hall. Website: www.serdp.org

Project: Collaborated with Sandia National Lab (Energy and Infrastructure Assurance) in energy micro-grid design for Fort Sill, OK. Sandia: <http://www.sandia.gov/mission/energy/index.html> ERDC POC: Tarek Abdullah, 217-

373-4432, tarek.abdullah@erdc.usace.army.mil Roch Ducey, roch.ducey@us.army.mil 217-373-6760. Collaborator: Sandia National Lab. Sponsor: Department of Energy.



Sustainable Facilities and Infrastructure

Lead: Mr. Richard Schneider, ERDC-CERL

USACE Sustainable Design Website: <https://eko.usace.army.mil/fa/sdd/>
Leadership in Energy and Environmental Design (LEED). U.S. Green Building Council: <http://www.usgbc.org/>



Activity: Rich Schneider, Richard.L.schneider@erdc.usace.army.mil, 217-373-6752, participated in U.S. military exchange with China related to construction of a sustainable Chinese military academy. Sponsor: William Van Houten, OSD-ATL.

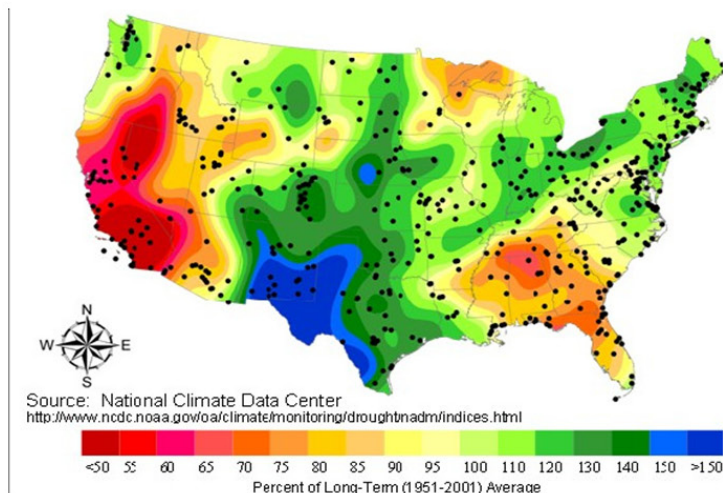
Forum: Conducted workshop on sustainable design using U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standards at Fort Hood, TX, in July 2007. ERDC POCs: Richard Schneider and Annette Stumpf.

Activity: Upgraded and added new materials for USACE sustainable development and design (SDD) website. ERDC POC: Annette Stumpf. Sponsors: Harry Goradia (HQ USACE) and John Scharl (Assistant Chief of Staff for Installation Management - ACSIM).

Publication: *DoD Sustainability Application Guide for Historic Properties*. Applies LEED-EB (Existing Building) Version 2.0 to Historic Buildings. This report provides specific discussion and strategies relevant both to historic preservation and sustainable design and development. <http://www.cecer.army.mil/techreports/ERDC-CERL-TR-07-15/ERDC-CERL-TR-07-15.pdf> ERDC POC: Julie Webster, Julie.L.Webster@erdc.usace.army.mil (217-373-6717). Sponsor: LEGACY.

Draft Publication: *LEED for Homes – Pilot Study - Evaluation for Use in Army Family Housing*. Draft ERDC-CERL Technical Report describing LEED-H Pilot project evaluation of Army Family Housing at Forts Lee and

Below: Recent precipitation map for CONUS installations



Huachuca. ERDCPOCs: Richard Schneider, Richard.L.Schneider@erdc.usace.army.mil 217-373-6752 and Annette Stumpf,



Golden Knights parachute unit headquarters at Fort Bragg achieved a Gold rating under SPIRIT.

Annette.L.Stumpf@erdc.usace.army.mil 217-373-4492. Sponsor: Mr. Paul Christensen, ACSIM.

Sustainable Forward Military Operations

Lead: Ms. Deborah Curtin, ERDC-CERL

Activity: Served as advisors on Environmental Intelligence Portal, a project of AEPI and the National Defense Center for Environmental Excellence (NDCEE), to gather environmental data for planning and assessment in forward operations (Jun 07). POCs: William Goran and Deborah Curtin. Sponsor: Steve Hearne, AEPI. Collaborator: Roger Morin, morinr@ctc.com.

Forum: Collaboration with ARO Environmental Sciences Program (<http://www.arl.army.mil/www/default.cfm?Action=29&Page=188>) and North Carolina State University on a workshop entitled *Technology Approaches for Current and Future Base Camp Sustainability* at Raleigh, NC, Sep 12-14, 2007. Purpose: to identify basic research needs to improve sustainable solutions for Army forward operations (basing, stability operations, re-construction). Participants: William Goran and Deborah Curtin, ERDC-CERL. Sponsor: Kurt Preston, ARO.



Forum: "Using Sustainability to Build Stability in Africa," Army War College (Jul 07 — first in a series of workshops planned). The purpose is to help fashion sustainable approaches for the new Africa command. Participant: William Goran, ERDC-CERL. Sponsors: Steve Hearne, AEPI, and Kent Hughes Butts, Army War College.

issues: <http://www.aepi.army.mil/foresight.html>. ERDC POC: William Goran, William.d.goran@us.army.mil, 217-373-6735. Sponsor: John Fittipaldi, AEPI.

Ecosystem Services and Natural Capital

Lead: Mr. William Goran, ERDC-CERL

Publication (pre-publication): White paper (Dec 06) as a background document for AEPI's *Foresight* bulletin entitled *Emerging Ecosystem Services and Markets* (Mar 07). AEPI *Foresight*

Sustainable Water Resources

Lead: Dr. Kathleen White, Cold Regions Research and Engineering Lab (ERDC-CRREL)

Publication (pre-publication): Drafted white paper (Aug 07) for SERDP, AEPI, and HQ USACE on water supply for military bases and potential technologies to stretch available water use. POCs: William Goran, Hany Zaghloul and Natalie Myer, ERDC-CERL.



Housing Soldiers in contingency operations must ensure quality of life while minimizing the environmental footprint and maintaining self-sufficiency when possible. Camp Bondsteel, Kosovo.



FY08 Planned Projects, Activities, and Forums

Anticipating Future Sustainability Issues

Lead: Mr. William Goran, ERDC-CERL

Activity: Foresight Initiative — CASI will continue to support the DASA-ESOH on emerging issues. During 2008, the forum will pursue topics identified in the July 2007 session (see previous section for a list of topics). CASI will have a role in developing background papers for some of these topics (e.g., water supply, regional engagement with outside the fence line stakeholders, and micro-grids). In addition, CASI will continue to help identify new issues that will shape work in 2009 and beyond.

Sustainable Regional Planning

Lead: Dr. James Westervelt, ERDC-CERL

Website: <https://eko.usace.army.mil/fa/serm/>

Proposed Project: Sustainable Regional Planning project - Southeast Fall Line region and Hawaii with NDCEE: <http://www.ndcee.ctc.com/> ERDC POC: Hany Zaghloul, hany.h.zaghloul@erdc.usace.army.mil, 217-373-3433. Collaborators: David Eady, CTC. Sponsor: Hugh Wolfe, Technology Office, Assistant Secretary of the Army for Installations and Environment.

Proposed Project - Phase II: SERPPAS — Sustainable planning issues in a selected region



(Benning to Eglin corridor) of the Southeast. Sponsor: OSD Sustainable Ranges Program, Jan Larkin. SERPPAS: <http://wrrc.p2pays.org/serppas/index.asp> ERDC POC: Jim Westervelt, james.d.westervelt@us.army.mil, 217-373-4530. Partnership: Will Allen, The Conservation Fund.

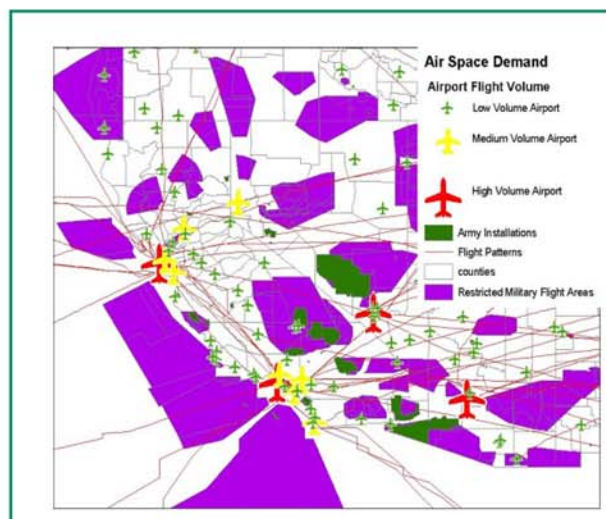
Proposed Project: 2.0 Release of the Sustainable Installations Regional Resources Assessment (SIRRA) tool. Sponsor: USACE, Malcolm McLeod. POC: Elisabeth Jenicek.

Sustainability Approaches, Education, and Knowledge Management

Lead: Ms. Michelle Hanson, ERDC-CERL

Proposed Project: European/U.S. Comparisons: Military Sustainability Approaches (proposed for FY08). ERDC POCs: William Goran and Michelle Hanson. An analysis of sustainability approaches and their effectiveness, with a focus on development of active exchanges between allied military organizations regarding sustainability goals, objectives, activities, and metrics for success. Sponsor: CASI tasks, AEPI.

Proposed Project: Sustainability Knowledge Sharing (proposed for FY08). Design and implement additional web collaboration and knowledge sharing capabilities for Army sustainability. These



Tools to model regional effects of proposed activities include LEAM and SIRRA.



CASI plans to exchange lessons learned with foreign military organizations through forums and a website.

efforts will extend and complement the existing Army sustainability website: <http://www.sustainability.army.mil/> with a focus on providing an easy environment for sharing and collaboration on sustainability approaches and innovations. ERDC POC: Annette Stumpf.

Planned Forum - German/U.S. Army Technical Exchange (Annex 5), Mar 08. ERDC POC: Hany Zaghloul.

Sustainable Facilities and Infrastructure

Lead: Mr. Richard Schneider, ERDC-CERL

USACE Sustainable Design Website: <https://eko.usace.army.mil/fa/sdd/>
Leadership in Energy and Environmental Design (LEED). U.S. Green Building Council: <http://www.usgbc.org/>

Forum: HENAAC Green Engineering Seminar, October 10-12, 2007, San Diego, CA.



Sponsor: Julio Arocho, HQ USACE Research and Development. Presentations by William Goran with Harry Goradia, HQ USACE.

Proposed Project: LEED-ND (Neighborhood Development) analysis – policy and design implications. AEPI, USACE, and Installation Management Command (IMCOM) Master Planners. ERDC POCs: Richard Schneider, Richard.L.schneider@erdc.usace.army.mil, 217-373-6752, and Annette Stumpf, annette.l.stumpf@erdc.usace.army.mil, 217-373-4492. Status: proposed for 2008 funding. Sponsor: John Fittipaldi, AEPI.

Planned Forum: JSEM (Joint Services Environmental Management) Sustainability Track – Green Building 101 and Army LEED Implementation 101. Overview of how the Army is applying and implementing LEED. ERDC POCs: Richard Schneider, Richard.L.Schneider@erdc.usace.army.mil 217-373-6752 and Annette Stumpf, Annette.L.Stumpf@erdc.usace.army.mil 217-373-4492. HQ USACE Sponsor: Harry Goradia.

Planned Projects: Army LEED Implementation:

- Construction manager training, online and across the Corps
- Release of LEED-NC (New Construction) Army Implementation Guidance
- Complete evaluation of LEED-EB for the Army
- Green Building support for Sino-US Military Environmental Protection Green Building Activities (China-US exchange)

ERDC POCs: Richard Schneider, and Annette Stumpf. HQ USACE Sponsor: Harry Goradia. ACSIM Sponsor: John Scharl.

Sustainable Forward Military Operations

Lead: Ms. Deborah Curtin, ERDC-CERL

Forum: Sustainable CONOPS Workshop sponsored by AEPI and ERDC was held in Crystal City Nov 6-7, 2007. Purpose was to begin

Bioretention - planters catch runoff from building to irrigate plants as part of sustainable design practices.



development of short-, mid-, and long-term strategies for achieving sustainable forward operations as described in the draft *Army Strategy for Sustainability*. The cornerstone of strategy development is a technology investment roadmap identifying forward facility current state and gaps, accompanied by a Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) analysis. ERDC POC: Deborah Curtin, deborah.r.curtin@erdc.usace.army.mil, 217-398-5567. Participants: Sam Hunter, Gary Gerdes, Stuart Foltz, Annette Stumpf, Tom Hartranft, and Sue Bevelheimer, ERDC-CERL. Multi-agency advisory forum includes: ARO, OSD, Force Provider, U.S. Army, Europe (USAEUR), MANSCEN-DEI, and Center for Army Lessons Learned.

Forum: Using Sustainability to Build Stability in Africa, Army War College (continuing series of workshops), second workshop: Oct 2-4, 2007. (Participant: Susan Ensore, ERDC-CERL.)

Scheduled Forum: SERDP annual symposium (Dec 4-6, 07, Washington, DC). William Goran will chair session on Sustainable Forward Basing. Sponsor: SERDP Program, John Hall. Participants include Kurt Kinnevan (DEI), Tom Hartranft (ERDC), Steven Tucker (Natick Soldier Research, Development and Engineering Command), Michael Chapkovich (Naval Sea Systems Command, Environmental Systems), MAJ Thomas Timmes, Penn State University, and Kurt Preston, ARO.

Sustainable Water Resources

Lead: Dr. Kathleen White, ERDC-CRREL

Forum: The Nature Conservancy and USACE Partnering Workshop, Wheeling, WV, Oct 1-4, 2007. Participant: William Goran, ERDC-CERL.

Proposed Project: Issue/policy study of water requirements and water supply projections for CONUS and OCONUS Army bases over the next several decades, with multiple scenarios for use requirements (including increased conservation measures) and for supply conditions. Sponsor: Michael Cain (David Sheets), AEPI.

Proposed Forum: Present technologies to "stretch" water resource supplies relevant to military bases and operations. Sponsors: SERDP and ERDC. Time: spring/summer 2008; exact date not yet determined.

Ecosystem Services and Natural Capital

Lead: Mr. William Goran, ERDC-CERL

Planned Forum: Ecosystem Services and Natural Capital workshop to be held at Eglin AFB, spring 2008. Sponsor: SERDP, 703-696-2117, www.serdp-estcp.org. Leader: Dr. John Wiens, Chief Scientist for The Nature Conservancy. ERDC POC (organizing committee): William Goran. Sponsor: SERDP Program Office, the Natural Capital Project: http://www.naturalcapitalproject.org/hawaii_prim.html

Publication: ERDC Special Report: *Understanding Military Implications for Emerging Ecosystem Service Markets* (spring 2008) by Elizabeth Keysar of CTC, <http://www.ctc.com/>. ERDC POC: Alan Anderson, alan.b.anderson@erdc.usace.army.mil, 217-373-7233. Sponsor: William Goran, ERDC-CERL.

Planned Activity: Collaboration with Fort Bragg to develop sustainable energy solutions and their concept for an Energy Battle Lab (prototyping sustainable energy innovations). Collaboration: Gay Kendall, RDECOM-FAST Science Advisor, XVIII Airborne Corps and Fort Bragg, 910-396-2522, gay.kendall@us.army.mil



A sustainable water supply, both for CONUS installations and forward operating bases, is critical to operational success.

Sustainable Energy Solutions

Lead: Dr. Tom Hartranft, ERDC-CERL

Website: <http://www.cecer.army.mil/td/tips/product/details.cfm?ID=1004>

Funded Projects:

Planned Project: The Army Installation Management Command (IMCOM) is supporting



energy analyses and audits at six European installations plus eight CONUS installations. ERDC will partner with DOE-Pacific Northwest National Lab (PNNL) and Huntsville Engineering and Support Center to conduct these audits. Typically, these efforts identify energy conservation initiatives yielding 10-20% energy savings per facility.

Planned Project: ACSIM plans to support the development of benchmarks for four Army building types: Dining Hall, Child Development Centers, Company Operations Facilities, and Army Reserve Center Facilities. ERDC is partnering with DOE-NREL and the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) to develop energy performance benchmarks and prescriptive technology listings that will reduce building energy consumption by 30% compared to current ASHRAE building standards. These new guidelines will be incorporated into USACE Model requests for proposals (RFPs) under the Military Construction (MILCON) Transformation initiative. ERDC completed three other building types in FY07: Barracks, Maintenance Facilities, and Battalion Headquarters Buildings. USACE has already implemented the prescriptive technology guidelines into MILCON Model RFPs for these building types.

Planned Project: Starting in FY08, ERDC will orchestrate several Congressionally directed industry funding recipients on projects related to reduced energy use. Projects relate to "net zero" housing, distributed generation, and fuel cells.

Planned Project: ACSIM plans to support, with the help of ERDC, several energy saving/recovery demonstration efforts. These include: 1) conversion of low-temperature geothermal heat into electricity rated at 250kW at Fort Polk, LA, 2) Building Integrated Photovoltaic System at Fort Huachuca, AZ, 3) Deployable-Renewable Energy Power Station at Fort Irwin National Training Center, CA, and 4) Gray Water Heat Recovery from barracks shower rooms at an installation to be determined.

Planned Forum: ERDC is collaborating DOE-PNNL to plan and orchestrate a 1-day Renewable Energy forum as part of IMCOM's semi-annual Energy Summit series. IMCOM Deputy

Director BG John A. Macdonald is scheduled to chair this important session in Dec 2007.

Activity: ERDC is actively collaborating with RDECOM and Rapid Equipping Force (REF) to identify Army requirements and mature power delivery architecture and energy sustainability for FOBs. Army and DOD have recognized this challenge and recently funded RDECOM for a \$30M, 6-year program called "HI-POWER" (Hybrid Intelligent Power) which will result in a new micro-grid network architecture for power. It will enable seamless plug and play of multiples, from tactical generators, commercial generators, solar, wind, vehicles (DC power likely) and grid (or "pole") power. The most important feature of this program is that it has the potential (through right-sizing and efficient use of generators) to reduce fuel consumption by 40-60% and maintenance by over 20%.



ERDC provides consultative support to REF in both energy conservation and power delivery measures as REF is funding a number of contractors to deploy prototype capabilities in Iraq and Afghanistan in 6-18 month time windows. An example includes coating fabric tents with foam for thermal insulation; this has shown greater than 50% reduction in energy needed for

air-conditioning. REF is also fielding early prototypes of wind and solar generation devices, although no logistics tail is currently being provided.

Planned Project: CASI (ERDC-CERL) will support SERDP as technical monitor on a new micro-grid design project conducted by Virginia Tech entitled *Modeling and Simulation of a DG-Integrated Intelligent Microgrid*.

Potential Project: For these FOB-focused initiatives by both REF and RDECOM, there needs to be a CONUS clearing house to do "proof of concept" evaluations under controlled conditions for these renewable solutions for the Warfighter. This capability could be set up at any of the CONUS training ranges — Active, Guard, Reserve.

Planned Forum: ERDC-CERL will provide one of four speakers presenting talks on "Energy Research at DoD" on Dec 10, 2007, at the monthly forum entitled *Energy: A Conversation About Our National Addiction* in Washington, DC.



New Focus Areas in FY08

Sustainable Materials

Lead: Ms. Vicki Van Blaricum, ERDC-CERL

Activity: Develop a new basic research topic for ERDC (AT23 program) to identify and exploit material properties that help achieve sustainable practices (decrease removal of toxins from the earth, decrease use of non-renewable energy resources, decrease material requirements, and increase equity globally and across generations).

Potential Project: Support of potential future transport system concept, through a Cooperative Research and Development Agreement with a private firm, by investigating material and strength requirements for elevated towers necessary to support this transportation and security concept.

Climate Change Impacts on Agency Facilities and Missions

Lead: Mr. William Goran, ERDC-CERL

Planned Forum: CASI is helping establish an informal interagency forum addressing the issue of how changing temperatures, changing rainfall

intensity and frequency, rising sea levels and other factors linked to climate change will impact agency capabilities. For DoD, there is language in the 2008 Defense Authorization Bill specifically related to this issue, and several agencies have already implemented processes to try and characterize their risks and potential adaptive responses. The forum is designed for agencies to learn from one another as they start to tackle this issue (POCs: William Goran, ERDC-CERL, Tim Hayden, ERDC-CERL, and Kathleen White, ERDC-CRREL).

Project: Developing a Greenhouse Gas (GHG) Footprint for Fort Carson, CO. Fort Carson, the National Defense Center for Environmental Excellence (NDCEE), and ERDC are developing the Army's first GHG footprint for an entire installation. The footprint is the combination of direct GHG emissions (originating within Fort Carson's boundary) and indirect emissions which are emitted outside the boundary, but are the result of activities at the installation (such as electricity purchases). Sequestration projects will also be addressed as part of the footprint. This effort is rooted in the existing Fort Carson Title V compliance database and emissions inventory contained in The Enviance System, an Environmental Management Information System being tested at Fort Carson and several other sites by the NDCEE. The protocols and procedures recommended by the World Resources Institute and other recognized organizations are being used as guidance for this effort. The Fort Carson Air Program staff is using the Enviance tool to develop the estimate, complete with the necessary calculations and reporting processes, for the GHG registries currently being considered by the Army. POC: Deborah Curtin